# BUFFEL GRASS (*CENCHRUS CILIARIS* L.) IS A HOST FOR THE SUGARCANE WHITEFLY *NEOMASKELLIA BERGII* (SIGNORET) (HEMIPTERA: ALEYRODIDAE) IN CENTRAL AUSTRALIA

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## Abstract

Buffel grass (*Cenchrus ciliaris* L.) is an introduced pasture plant that occurs over much of central Australia. The effects of buffel grass on invertebrate diversity in Australia are largely unknown. The sugarcane whitefly, *Neomaskellia bergii* (Signoret), was discovered infesting buffel grass at several sites in Alice Springs during May and June 2008. The current study is the first record of *N. bergii* in central Australia and the first time that buffel grass has been recorded as a host plant for this species in this country.

## Introduction

Buffel grass (*Cenchrus ciliaris* L.) (Poaceae) is a pasture plant native to Africa, southern parts of Asia and India (Lazarides *et al.* 1997). Although knowledge of the entry of this species into Australia is incomplete, what is established is its accidental introduction into northwestern Western Australia in the 1870s (Marriott 1955). This was followed by deliberate sowing throughout Queensland and New South Wales from the 1920s to the 1960s (Allen 1956, Flemons and Whalley 1958, Humphreys 1967) and in northern parts of the Northern Territory in the 1950s and 1960s (Cameron *et al.* 1984).

The first recorded presence of buffel grass in central Australia was of a specimen identified from Alice Springs (White 1930) and, following trials (*e.g.* Winkworth 1963), plantings were conducted in this area throughout the 1960s and 1970s for pasture improvement, prevention of soil erosion and dust control (Keetch 1981, Allan 1997). Buffel grass has spread widely from these introduction points and now occurs across all land tenures in central Australia (Puckey and Albrecht 2004). With this expansion there has been a concomitant reduction in biodiversity and alteration of fire regimes. For example, Franks (2002) and Jackson (2005) demonstrated that native plant species richness was lower in *C. ciliaris*-dominated sites than in sites without cover or with reduced cover of *C. ciliaris* in Queensland. The same result occurred in Alice Springs (Clarke *et al.* 2005). In addition, Miller (2003) found that buffel grass invasion in central Australia was significantly correlated with increased fuel load and burn severity. Overseas studies have also reported displacement of native vegetation and reduced plant and animal species diversity in areas where buffel grass predominates (*e.g.* Flanders *et al.* 2006).

While the effects of buffel grass on floral diversity and landscape ecology are becoming increasingly understood, there is very little information on its effects on invertebrate biodiversity in Australia and, especially, on the

identity and provenance of invertebrate species supported by buffel grass. In May 2008, several populations of the sugarcane whitefly, *Neomaskellia bergii* (Signoret), were discovered on uncultivated buffel grass plants growing at one site in Alice Springs. Further surveys were conducted to determine the extent of the distribution of *N. bergii* in Alice Springs.

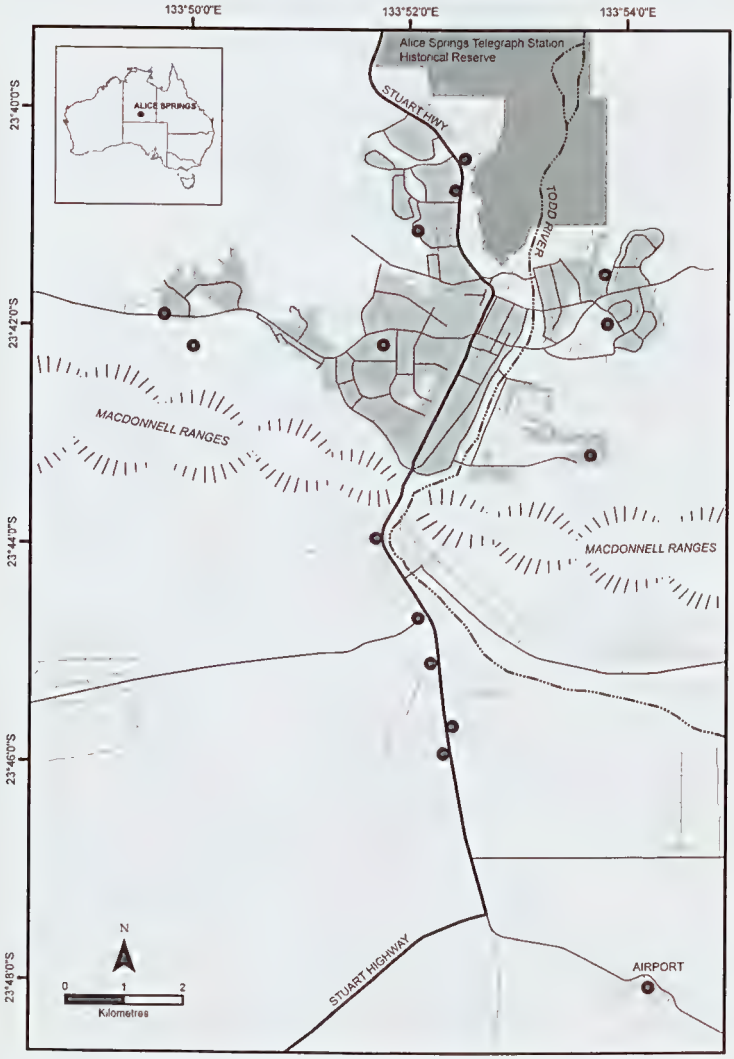



**Fig. 1.** Map of the Alice Springs area, showing the distribution (•) of the sugarcane whitefly, *Neomaskellia bergii*, in June 2008.

## Results

Sampling revealed the presence of *Neomaskellia bergii* at fifteen sites in Alice Springs (Fig. 1). Only three of the eighteen targeted sites did not yield whitefly populations. All plants supporting whitefly populations were uncultivated and grew close to a water source such as stormwater pipe drains or, more commonly, in well-watered ornamental situations such as parks and gardens. Each site comprised between one and thirty colonised plants.

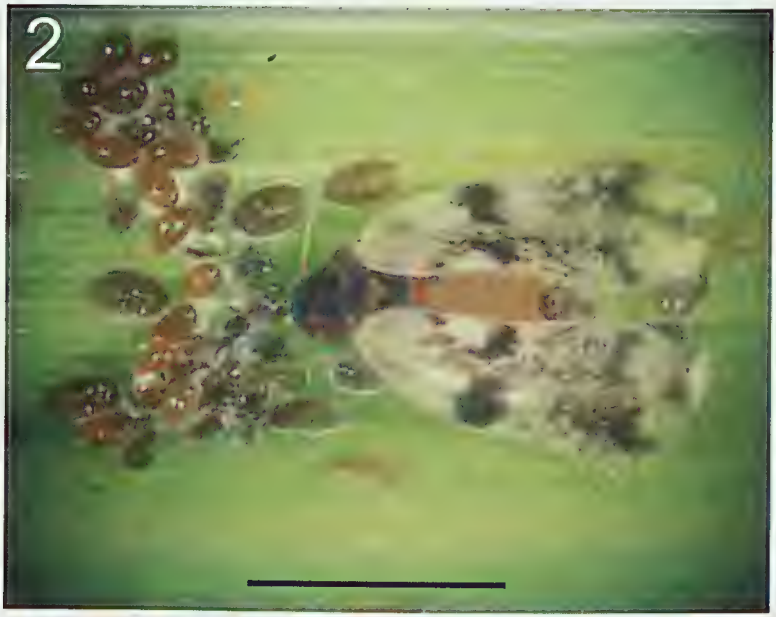
All life history stages (adults, larvae, eggs) of *N. bergii* were usually present on each leaf (Fig. 2), although occasionally single adults or adults with eggs only were observed on leaves. All individuals were crowded on the ventral surface of the leaf blade (Fig. 3), near the junction with the sheath. Most of the whitefly populations were tended by ants from one or more of the genera *Camponotus* Mayr, *Iridomyrmex* Mayr and *Solenopsis* Westwood. Whiteflies were not observed on native grasses (*Dicanthium*, *Enneapogon*, *Enteropogon*) growing adjacent to or among *Cenchrus ciliaris* plants harbouring populations of *N. bergii*.

## Discussion

*Neomaskellia bergii* is widely distributed throughout the Afrotropical, Australian, Oriental and eastern Palaearctic regions (Mound and Halsey 1978). Outside Australia it is known from a wide variety of host plants belonging to the family Poaceae, such as *Bambusa* sp. (bamboo), *C. ciliaris*, *Panicum maximum* (guinea grass), *Paspalum conjugatum* (sourgrass), *Pennisetum* spp., *Saccharum officinarum* (sugar cane), *Setaria italica* (Italian millet, foxtail millet) and *Sorghum* spp (Mound and Halsey 1978).

In Australia, *N. bergii* has been known from coastal Queensland for almost 100 years, where it colonises *Saccharum officinarum*, *Setaria palmifolia* (palm grass) and *Sorghum bicolor* (Carver and Reid 1996, Martin 1999). Despite its long history in Queensland, circumstantial evidence suggests that *N. bergii* is unlikely to be an Australian native, as none of the known host species are native to Australia. This species was first collected from sugar cane near Cairns in 1918 (Carver and Reid 1996) and may have been introduced into Queensland soon after sugar cane was first cultivated in that area.

Based on recent collection records, the distribution of *N. bergii* is expanding. Locality data show that specimens were collected from sorghum in Quilpie, southwestern Queensland in 1993 (the only other record from inland Australia) and the species has more recently been collected from *Paspalum scrobiculatum* (kodo millet, scrobic) in Darwin (Anon. 2001). The current study provided the first record of *N. bergii* from central Australia and this is the first time that buffel grass has been recorded as a host plant for this species in Australia.





**Figs 2-3.** Colonies of sugarcane whitefly on buffel grass. (2) eggs, larvae and one adult *N. bergii* on the leaf blade; scale bar = 1 mm. (3) typical clustering of adults, larvae and eggs of *N. bergii* on the ventral surface of leaf blades; also visible are ants from the genus *Iridomyrmex* tending whiteflies.

As the sugarcane whitefly has been found at multiple sites, it has probably been present in Alice Springs for some time. With such a large reservoir of populations, other localities in central Australia are also likely to be colonised by this species, but only where sufficient moisture can maintain growth of buffel grass for prolonged periods of time, such as beside waterholes, creeks and stormwater drains, as well as near human dwellings. Inadequate rainfall in the arid zone means that such situations would be sparse; however, the potential for *N. bergii* to colonise areas following periods of above average rainfall is probably high.

Crowding under leaf blades and ant-attendance are distinctive features of both species of *Neomaskellia* Quaintance & Baker (Martin 1999). The presence of all life history stages in most surveyed populations indicates that the species is continually breeding on buffel grass.

The only other insect known to regularly utilise buffel grass as a host in Australia is the buffel grass seed caterpillar, *Mampava rhodoneura* (Turner) (Lepidoptera: Pyralidae), which also occurs in Queensland and which webs together the plumes of seed coats before feeding on the seeds (Cantrell 1981). In this way, seed yield can be significantly reduced (Cantrell 1981, Common 1990). Although *N. bergii* is usually considered to be a minor pest of sugarcane, it has infested the Queensland crop in large numbers (Mungomery 1930) and populations in India have caused stunting and malformation of Italian millet as well as the development of sooty mould (Vasantharaj and Raghunath 1977). The current investigation has shown that, in this case, buffel grass has had a negative effect on biodiversity by supporting a species which is most likely introduced and which affects agricultural, horticultural and natural environments. Buffel grass has also had negative effects on invertebrate diversity in semi-arid regions of other countries, where infestations have led to reduced abundance of arthropods in the U.S.A. (Flanders *et al.* 2006) and likely alteration of ant community composition in Mexico (Bestelmeyer and Schooley 1999).

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